New Galatheoidea (Crustacea, Decapoda, Anomura) from hydrothermal systems in the West Pacific Ocean: Bismarck Archipelago and Okinawa Trough

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ABSTRACT

Two anomuran decapod crustaceans of the superfamily Galatheoidea that are new to science are described from hydrothermally active areas of the western Pacific Ocean. *Uroptychus edisonicus* n.sp., family Chirostylidae, from a volcanic crater on Edison Seamount near Lihir Island, Bismarck Archipelago, Papua New Guinea, is the third species of the genus known to occur in hydrothermally active areas, both of the others coming from the North Fiji Basin. The new species is more similar to non-hydrothermal congeners from the Banda Sea and the central North Pacific Ocean than to those known from vent areas. *Shinkaia crosnieri* n.g. n.sp., family Galatheidae, from active hydrothermal areas in the Okinawa Trough and Edison Seamount is placed in the monotypic Shinkaiinae n. subfam. having similarities to the Munidopsinae, but with distinctive characters of its own including carapace shape and ornamenration, very short (or reduced) epipods on the third maxillipeds, features of thoracic sternum, legs, and dense ventral mat of setae.

KEY WORDS
hydrothermal systems,
West Pacific Ocean,
Chirostylidae,
Uroptychus,
Galatheidae,
Shinkaiinae,
Shinkaia,
biogeography.

RÉSUMÉ

Galatheoidea (Crustacea, Decapoda, Anomura) nouveaux des écosystèmes hydrothermaux du Pacifique occidental : archipel de Bismarck et fosse d'Okinawa. Deux crustacés décapodes anomoures de la superfamille des Galatheoidea, nouveaux pour la science, sont décrits de sites hydrothermaux du Pacifique occidental. *Uroptychus edisonicus* n.sp., de la famille des Chirostylidae, provenant d'un cratère volcanique sur le Seamount Edison près de Lihir dans l'archipel de Bismarck en Papouasie-Nouvelle-Guinée, est la troisième espèce du genre connue de sites hydrothermaux, les deux autres provenant du bassin nord-fidjien. La nouvelle espèce est plus proche de ses congénères non-hydrothermaux de la mer de Banda et du nord du Pacifique central que de ceux de sites hydrothermaux. *Shinkaia crosnieri* n.g. n.sp., de la famille des Galatheidae, est originaire des sites hydrothermaux de la fosse d'Okinawa et du Seamount Edison ; elle est placée dans une nouvelle sous-famille monotypique Shinkaiinae, qui présente des ressemblances avec les Munidopsinae, mais aussi des caractères distinctifs propres comme la forme et l'ornementation de la carapace, des épipodites sur les troisièmes maxillipèdes très courts (ou réduits), les caractéristiques du sternum thoracique, des pattes, et un tomentum dense de soies ventrales.

MOTS CLÉS
écosystème hydrothermal, Pacifique occidental, Chirostylidae, *Uroptychus*, Galatheidae, Shinkaiinae, *Shinkaia*, biogéographie.

INTRODUCTION

Exploration of hydrothermal environments continues to disclose species previously unknown to science. On several occasions, scientists diving in the Japanese DSRV *Shinkai 2000* collected and recorded on video tape a number of samples and numerous views of a galatheid decapod crustacean species from hydrothermally active areas of the Okinawa Trough (Fig. 1) (for general locations see Halbach *et al.* 1989; Sakai *et al.* 1990; Hashimoto *et al.* 1995). This same galatheid and an unknown chirostylid decapod crustacean were collected from a submarine volcano by scientists on board the German RV *Sonne* while mapping largely uncharted offshore areas of the Tabar-to-Feni island chain in the New Ireland Basin of Papua, New Guinea from March 11 to April 5 1994 during the Epithermal Deposits Southwestern Pacific Ocean (EDISON) cruise (Herzig *et al.* 1994, charted location). The site of this sampling was a volcanic cone on Edison Seamount south of Lihir Island. The new chirostylid, *Uroptychus edisonicus*, is described and illustrated from the unique representative collected. Specimens of the new galatheid *Shinkaia crosnieri* from both of the above localities are described, illustrated, and identified as a new genus and species in a new subfamily, the Shinkaiinae, placed near the Munidopsinae (Baba 1988).

The sites from which these samples were collected lie more than 4400 km apart. In this region, hydrothermalism associated with calderas at modest depth (< 1500 m) represents a variation from much deeper submarine hydrothermal systems associated with mid-ocean ridge spreading or subduction zones (Takeda & Hashimoto 1990; Hashimoto *et al.* 1995). The Okinawa Trough lies near a juncture of the Eurasian and Philippine plates while the New Ireland Basin lies on the eastern arc of the North Bismarck Plate in the tectonically complex Bismarck Archipelago region (Hamilton 1979, maps on figures 145, 146). The sites thus are in disjunct regions of the northern West Pacific back-arc complex (Galkin 1992).

Abbreviations

JMSTC	Japan Marine Science & Technology Center, Yokosuka (Japan);
MNHN	Muséum national d'Histoire naturelle, Paris (France);
USNM	Holotypes and paratypes of new taxa deposited in the U.S. National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USA);
che	Cheliped length, tip of rostrum to ventral articulation with sternum;

cl	Carapace length, tip of rostrum to posterior margin of carapace;
coll.	Collector;
Rpr	Length propodus of cheliped, ventral articulation with carpus to tip of propodal finger, right;
Lpr	Same, left;
P	Pereopod;
Pl	Pleopod;
scl	Short carapace length, base of eyestalk to posterior margin of carapace;
tl	Total length, tip of rostrum to posterior margin of telson plates;
w	Maximum width of carapace.

SYSTEMATICS

Family CHIROSTYLIDAE Ortmann, 1892

Uroptychus edisonicus n.sp.
(Figs 1, 2)

MATERIAL. — **Bismarck Archipelago.** West Pacific Ocean, Papua New Guinea, Edison Seamount, near Lihir Island, 3°19.07'S - 152°34.92'E, 1492 m, RV *Sonne* No. Sbb-1535, 29.III.1994, coll. M. Hannington & I. Jonasson: holotype, ovig. ♀ (USNM 251479).

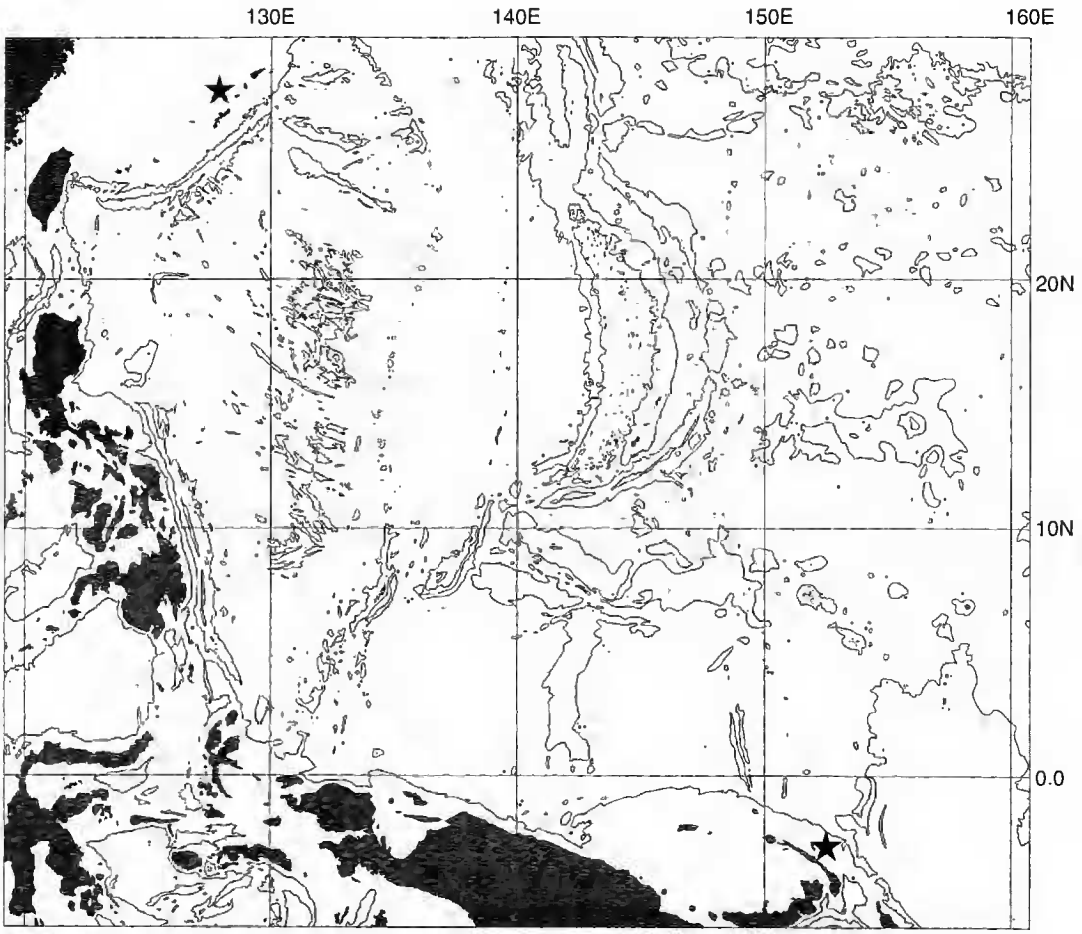

FIG. 1. — Philippine Sea, bathymetry charted at 3000 m intervals, land areas shaded. Bordered on west (left) by Taiwan, Philippine Islands, and south by Papua New Guinea. Sample localities starred, Okinawa Trough upper left, Lihir Island lower right. Base map from British Oceanographic Data Centre (1994).

ETYMOLOGY. — The species is named for Edison Seamount, from which it was collected.

MEASUREMENTS. — cl, 6.24; 5cl, 4.20; chl, 17.5; ova (3 present), 1.28 × 1.39 (in millimetres).

DIAGNOSIS

Carapace dorsally smooth, with sparse short fine setae, lateral margin divergently convex, feebly indented, anterolateral spine small but distinct; greatest width of carapace measured at about posterior one quarter of length excluding rostrum. Rostrum triangular, 0.54 times as long as remaining carapace, not carinate ventrally. Lateral orbital angle acuminate. Eyestalks subcylindrical, barely reaching midlength of rostrum; cornea not dilated, length more than that of remaining eyestalk. Antennal peduncles unarmed on distal two segments, antennal scale reaching end of ultimate segment of peduncle. Third thoracic sternite anteriorly concave, without median notch and spines. Chelipeds relatively slender, unarmed. Walking legs unarmed dorsally; propodi distally broadened; dactyls with prominent, proximally diminishing spines on prehensile margin.

DESCRIPTION

Carapace excluding rostrum shorter than greatest width; dorsal surface convex, smooth, with sparse fine setae, minutely punctate, without ridge along posterolateral margin. Lateral margins convexly divergent posteriorly, spineless except for small but distinct anterolateral spine; greatest width of carapace between insertions of second and third walking legs. Lateral orbital angle acuminate.

Rostrum elongate triangular, 0.54 times postorbital carapace length, one to three asymmetrically arranged spines on each lateral margin tapered distal portion; tip slightly damaged but apparently acuminate.

Sternal plastron wide relative to length; third thoracic sternite concave, without median notch and spines on anterior margin, moderately depressed in ventral view; fourth thoracic sternite with convex, finely denticulate lateral margin. Abdominal segments smooth, glabrous and spineless.

Antennular peduncles with disto-lateral and -mesial processes on basal article simple but well developed. Antennal peduncles with distal article longer than penultimate article, both unarmed; antennal scale slightly broader at base than penultimate article, reaching end of distal article.

Third maxillipeds with ischium bearing crest of many (more than 30) corneous spines on mesial ridge, slightly more widely-spaced proximally than distally; merus unarmed on flexor margin, bearing blunt distolateral process; dactyl and propodus densely setose on prehensile surfaces, dactyl spatulate at tip.

Chelipeds smooth, finely setose, length 3.8 times postorbital carapace length; ischium with blunt dorsal process; merus, carpus and palm unarmed; palm slightly wider and 1.3 times as long as carpus, length 4.3 times width; fingers curving ventrad, opposable margins of movable finger with low process somewhat distal to midlength and proximal to smaller opposing process on movable finger.

Walking legs somewhat compressed, smooth and shining, very lightly setose, propodus of first and second distoventrally broadened and spined, third less so, to oppose flexor surface of slightly curved dactyl bearing strong rather evenly-spaced spines on flexor margin, six on first, seven or eight on second and third respectively; length of dactyl/propodus on right side, first walking leg 0.59, second 0.51, third 0.66.

REMARKS

So far only two species of the genus *Uroptychus* are known from active sites of hydrothermal vents: *U. bicavus* Baba *et* de Saint Laurent, 1992 and *U. thermalis* Baba *et* de Saint Laurent, 1992, both from the North Fiji Basin. These are phylogenetically rather remote from this new species in their elongate carapace, the third thoracic sternite bearing two submedian spines on the concave anterior margin, and the short antennal scale. The small anterolateral spine, shapes of the sternal plastron, third maxillipeds and chelipeds, and lack of spines on distal two articles of the antennal peduncles, are similar to *U. setosidigitalis* Baba, 1977 from off Midway Island. The latter species is distinctive in the carapace being smooth on the lateral margins and the walking legs bearing strongly curved densely setiferous dactyls.

The walking legs having propodi distally widened and dactyls armed with strong spines on prehensile margins are also possessed by *U. hamatus* Zarenkov *et* Khodkina, 1981 from the Marcus-Necker Rise, and *U. xipholepis* Van Dam, 1933 from the Banda Sea. The latter two species are characterized by the carapace bearing a row of lateral spines, the chelipeds bearing spines on the merus and carpus, and the antennal peduncles bearing strong spines on the distal two articles.

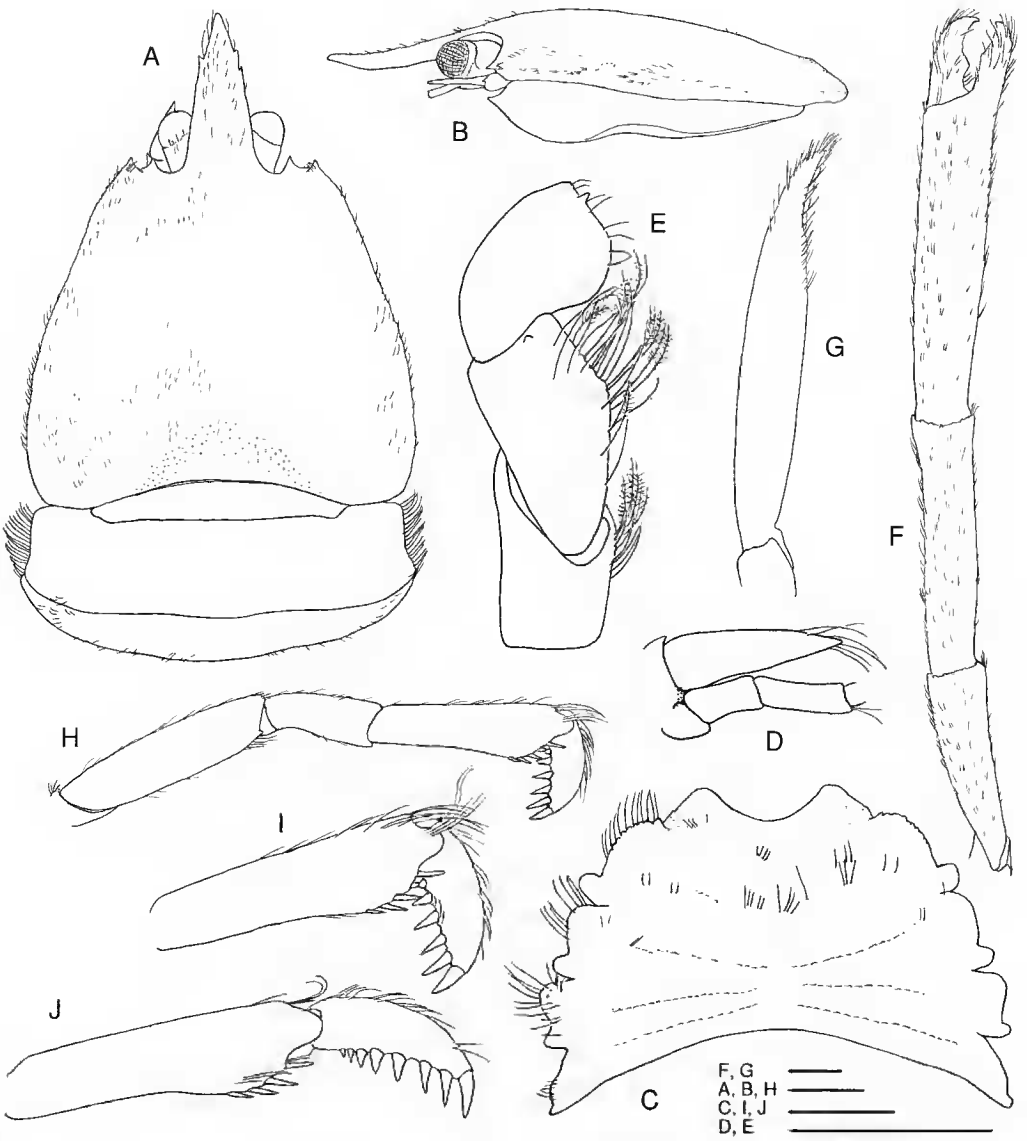

FIG. 2. — *Uroptychus edisonicus* n.sp., holotype ♀ ovig. USNM 251479; **A**, carapace and abdomen, dorsal; **B**, carapace, lateral; **C**, sternal plastron; **D**, right antenna, ventral; **E**, endopod of right third maxilliped (distal two segments omitted), lateral; **F**, right cheliped, dorsal; **G**, chela of same, lateral; **H**, right first walking leg, lateral; **I**, distal segments of same, lateral; **J**, distal segments of right second walking leg, lateral. Scale bars : 1 mm.

Family GALATHEIDAE Samouelle, 1819
Subfamily SHINKAIINAE n. subfam.

DIAGNOSIS
Carapace slightly convex, without grooves on dorsal surface, lateral margins smoothly convex, slightly upturned and bearing many forward trending spines in adults. Strong angle lateral to flattened, immobile basally fused eyestalks with cornea on ventral surface, orbit obscure in dorsal view. Pterygostomian flap anteriorly produced, covering greater part of antennal peduncle. Dense long plumose setae on sternum, pterygostomian flap, and ventral surface of pereopods. Chelipeds strong, broad, depressed and nearly equal, propodal finger bearing ventral longitudinal pit. Walking legs stout and moderately flattened, dactyls bearing prehensile comb of dense corneous setae. Gill formula, ten arthrobranchs, four pleurobranchs, epipods present on maxilliped 3 and legs 1-3. First maxilliped without lash. The subfamily contains only the following genus.

Shinkaia n.g.

TYPE SPECIES. — *Shinkaia crosnieri* n.sp.

ETYMOLOGY. — From the name of the deep submersible *Shinkai 2000*. The gender is feminine.

DIAGNOSIS
Characters as for the subfamily.

Shinkaia crosnieri n.sp.
(Figs 1, 3-6)

MATERIAL. — **Bismarck Archipelago.** West Pacific Ocean, Papua New Guinea, Edison Seamount, northeastern crater rim near Lihir Island, 3°18.85'S - 152°34.92'E, 1483 m, RV *Sonne* No. S29-1531, 20.III.1994, coll. M. Hannington & I. Jonasson: holotype ♂ (USNM 251480); 2 paratypes ♀♀, 1 ovig., 1 newly molted (USNM 251481).
Okinawa Trough. 27°32.7'N - 126°58.2'E, 1394 m, DSRV *Shinkai 2000* Dive/Cruise No. 2K#479, 13.V.1990: 2 paratypes ♂♂ (USNM 251482; JMSTC Ano-0001-90). — 27°16.2'N - 127°04.9'E, 1330 m, 130-200 °C, DSRV *Shinkai 2000*, 10.IX.1988, coll. Masaaki Kimura: 2 paratypes, 1 ♂, 1 ♀ with tip of rostrum cracked (MNHN-Ga 4239). — 27°33.0'N - 126°58.0'E, 1390 m, DSRV *Shinkai 2000* Dive/Cruise No. 2K#672, 14.V.1993: 3 paratypes, 1 ♂, 2 ♀♀, male with abdomen broken, tips of fingers worn on both chelae (JMSTC Ano-0006-93).

MEASUREMENTS. — See table 1.

ETYMOLOGY. — The species is named in honour of Alain Crosnier, eminent decapod crustacean systematist.

DESCRIPTION
Carapace longitudinally oval in dorsal view; lateral margin becoming slightly upturned in large adults, bearing many similar shaped, forward trending, closely-set small spines, one to four anterior to notch demarking anterior branch of cervical groove, larger spine following notch succeeded by 25-30 small spines in unbroken file, though absent from posterolateral part of branchial region, many of them doubled or supernumerary, but poorly developed in young and obsolescent in large adults. Dorsal surface fairly smooth, unevenly ornamented with ciliated punctations, many tending to be associated with obsolescent small transverse rugae, more prominent on flattened peripheral zone than on elevated gastrocardiac region.
Rostrum prominent, flattened dorsally, straplike in outline, margins sometimes slightly bowed laterally at one quarter length, then converging along two-thirds of length, but distal third often rather abruptly triangular with sides bearing five to eight asymmetrically arranged small, anteriorly directed spines (if not obsolescent from wear), ending in subacute distal spinelike tip ornamented with ill-defined circlet of strong subapical setae. Rostral margins merging basally with similarly flattened, concave orbital margins, each flanked laterally by subtriangular antennal spine, slightly sinuous on mesial margin, and with lateral margin leading to tip slightly upturned to form shallowly cupped dorsal surface.
Pterygostomian flap hinged beneath overhanging lateral margin of carapace, generously clothed with long plumose setae set in anterolaterally trending rows of short impressed linear pits, but with anterodorsal surface slightly granular and relatively unciliated; each plate anteriorly subtriangular, with dorsal submarginal longitudinal ridge and tipped by rather acute anterior spine

falling slightly short of plane perpendicular to distal level of antennal peduncle, often with smaller supernumerary spines above tip and one or two below it; ventral margin indented to facilitate free movement of cheliped.

Abdominal segments 2-6 with terga bearing tufts of setae distributed in two transverse rows, terga not transversely ridged; pleura directed laterally, those of segment 2 asymmetrically triangular with rounded tip, pleura of segments 3-5 more or less squared laterally and bearing soft setae ventrally, those of segment 6 narrower and with posterior margin sinuously oblique.

Tailfan bearing long dense setae on distal margin; telson made up of seven unequal platelets, but suggestion of two elongate intercalated platelets between large medial and posterior ones at either side, medial platelets with dense lateral fringe of short setae in male; deep narrow cleft in middle of posterior margin. Uropods broad, large protopod with distal margin scalloped, its mesiodistal lobe bearing obsolescent marginal spines, mesial and lateral rami each with convex lateral margin.

Eyestalks each a dorsally flattened projection nearly as wide at base as rostrum and nestled under rostrum and antennal spine at sides; broadly fused ventral to base of rostrum, shallowly concave and lightly spined on mesial margin; somewhat convex laterally, extending to or

FIG. 3. — *Shinkaia crosnieri* n.sp. clustered *in situ* on rocks associated with hydrothermalism, Okinawa Trough, Ihiya Seamount, 27°32.6'N - 126°58.2'E, 1410 m, DSRV *Shinkai 2000* Dive 366, 12.IX.1988. In addition to the new galatheoids, bresiliid shrimps are seen in lower left hand corner and upper center of picture, others may be hidden. Photo provided by Jun Hashimoto.

TABLE 1. — Measurements of *Shinkaia crosnieri* n.sp. For paratypes JMSTC Ano-0006-93: total lengths of all specimens are approximate because the abdomen is almost impossible to extend to a stable length, and its articulation with the cephalothorax is extremely flexible.

		cl	scl	w	tl	Rpr	Lpr
Holotype							
USNM 251480	♂	37.2	25.8	26.2	60.0	24.9	26.5
Paratypes							
USNM 251481	♀ ovig.	43.7	32.8	30.2	76.5	29.3	29.2
	♀ newly molted	35.9	28.0	28.4	64.0	23.0	22.5
	Egg size (oval), mean of 4 = 3.5 × 4.4						
USNM 251482	♂ heavy fouling	36.3	28.4	25.4	62.2	21.1	16.5
	♂	33.1	26.6	22.3	56.6	20.4	20.0
MNHN-Ga 4239	♀	21.3	16.6	15.9	39.0	10.5	11.0
	♂	13.0	10.2	8.9	21.0	6.2	7.0
JMSTC Ano-0006-93	♀	39.6	31.3	29.5	71.5	22.5	21.0
	♂	52.7	41.2	37.7	86.9	43.0	37.6
	♀	23.4	18.7	16.9	42.5	11.4	12.0

beyond base of triangular rostral tip and bearing one or more strong lateral spines near midlength followed by obsolescent small spines along proximal sector of distolateral margin tapering to acute tip ornamented with ill-defined circlet of strong subapical setae; slender, colorless, transverse band ventrally near base representing vestigial cornea, slightly angular and broadened mesially in ovigerous female, but sometimes interrupted, and apparently obsolescent in large males; part of cornea visible from dorsal and lateral view in some specimens.

Antennular peduncles with strong basal article bearing two well separated slender spines laterally, their tips extending nearly to level reached by tip of lateral spine of eyestalk, lower spine slightly mesial to spine above it. Antennal peduncles with four more or less depressed articles evident; fixed basal article bearing strong lateral spine overreaching articulation with article 2; latter bearing closely appressed triangular flattened lateral spine and two mesioventral spines; article 3 with mesial spine and three spines ventrally on distal margin, partly fused; terminal article extending nearly to level reached by lateral spine of eyestalk; flagellum reaching about to tip of extended cheliped.

Ventral aspect of cephalothorax bearing markedly dense, long, plumose pilosity on proximal articles of Mxp3, coxal, basial, ischial and meral articles of P1-4, and on sternal plates. Epipods present on Mxp3 and P1-3, all short.

Mouthparts as illustrated in Fig. 6. Third maxillipeds with well-developed exopod; articles more or less sculptured, except for propodus and dactyl; dactyl bearing dense terminal tuft of setae, propodus relatively broad and short, with similar terminal tuft; carpus with mesial shoulder bearing dense tuft of setae; sparser mesial tuft on irregularly volute merus and ischium, latter with concave margin bearing small teeth distinct in small specimens especially on distal half, obsolescent in large specimens; denser setae on basis and coxa, latter bearing small mesial spine; epipod short and tapered to acute tip; anterior arthrobranch well-developed, with row of eight palmate lamellae on distal margin, posterior arthrobranch similar, with more numerous lamellae.

Chelipeds (P1) strong, nearly equal. Merus with strong mesiodistal spine, smaller distolateral spine, distodorsal margin bearing widely-spaced tubercles, subdistal dorsal row of about seven irregular small spines continued as setae at either end, largest spine in row near anterolateral corner of dorsal patch of transverse obsolescent

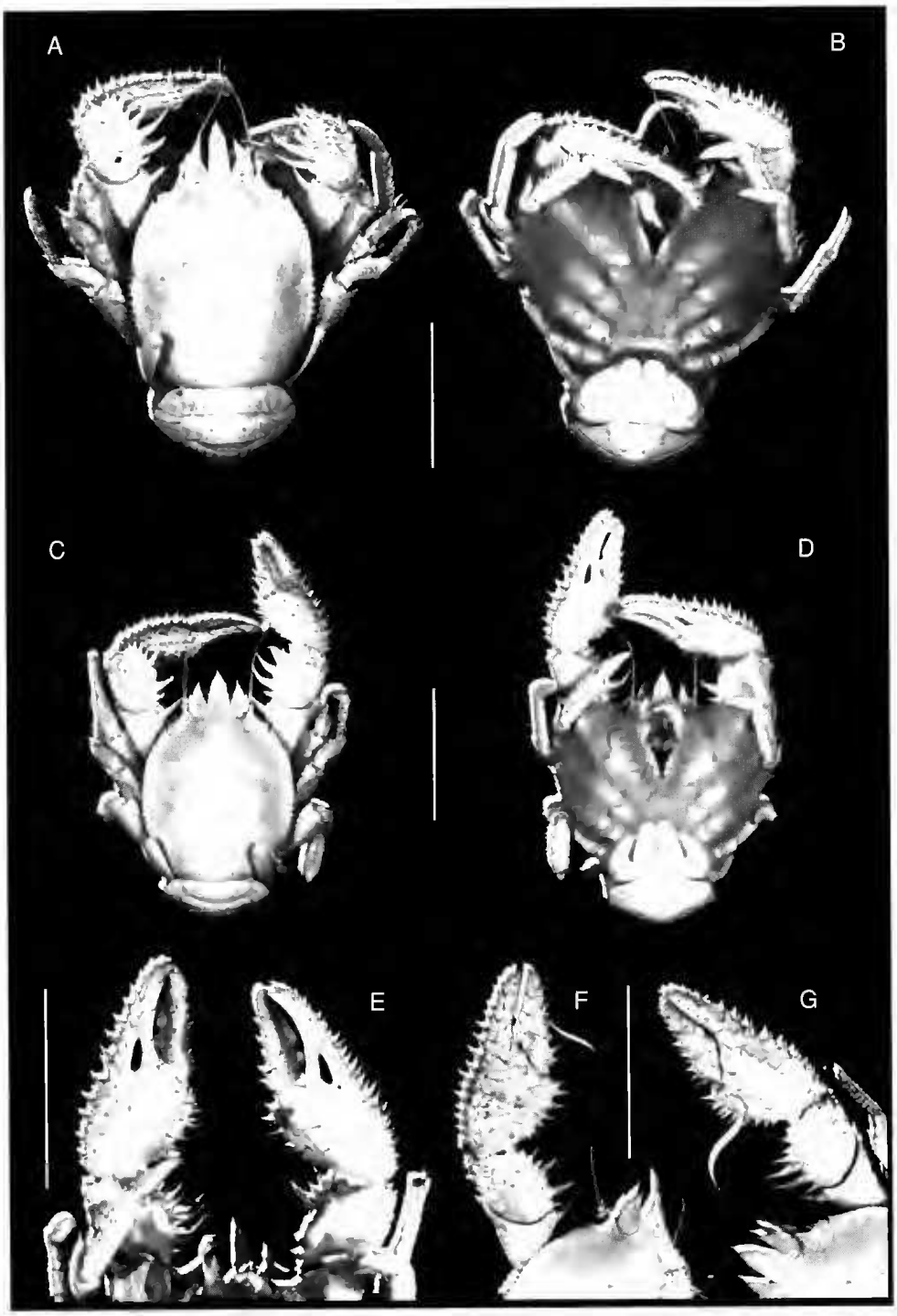

FIG. 4. — *Shinkaia crosnieri* n.sp.; **A**, **B**, paratype ♀, cl. 35.9 mm, USNM 251481; **A**, dorsal; **B**, ventral; **C**-**G**, holotype ♂, cl. 37.2 mm, USNM 251480; **C**, dorsal; **D**, ventral; **E**, chelipeds, ventral; **F**, same, left dorsal; **G**, same, right dorsal. Scale bars: 20 mm.

rugae and setae behind it. Carpus with seven strong mesial spines, curved middorsal longitudinal row of seven spiniform tubercles, spined squames on anterior margin, and tract of about three irregular lateral longitudinal rows of varied small stout spines laterally ending in small antero-lateral spine. Chela with fingers straight, prehensile serrated edges closely approximated in distal five-eighths of length followed proximally by slight gape and molariform tooth near base; palm of propodus bearing crest of seven to eight strong mesial spines, and about seventeen spines laterally along both palm and fixed finger ending in strong curved calcareous tooth at tip, below this row another row of about 15 smaller spines; ventral, deeply excavated longitudinal pit near articulation of dactyl slightly asymmetrical and narrowly obclavate; dactyl with crest of eight to nine varied mesial spines ending in curved tooth at tip, forming with tip of serrate prehensile edge a fork for receiving tip of fixed finger; scattered tufts of setae on all surfaces in rows, set in pits, on spines, or associated with obsolescent rugae.

Walking legs (P2-4) similar to each other in structure; coxa, basis, ischium fringed with setae dorsally, ventrally, and on surfaces adjacent to articular membranes; merus with thick tracts of setae on all surfaces, but setae on carpus, propodus and dactyl confined to tufts emerging from widely spaced pits; dorsal crest of spines on merus, carpus and propodus, those of merus and carpus ending in distally projecting terminal spine; carpus and propodus with dorsolateral crest of smaller spines; less prominent ventral crest of spines on merus ending in strong ventrolateral spine; P3-4 with lateral aspect of merus bearing numerous ciliated pits at base of tubercles, P2 less prominently ornamented laterally; P2-4 carpus and propodus with dorsal crest of eight to ten spines ending in extended distal spine and flanked by dorsolateral row of about nine smaller spines; P2 with thickly scattered low tubercles laterally, but P3-4 with smooth central tract and ventrolateral tract of tubercles; corneous ventral spine often at either distal side of articulation between carpus, propodus, dactyl; dactyls of P2-4 with comb of 17-18 anteriorly trending corneous spines on prehensile edge, strong tip corneous. Chelate P5 much more slender than preceding legs, smoother and folded on itself at merocarpal joint, most noticeable setae in thick cleaning brush on mesial aspect of chela and laterally on distal part of palm and full length of fingers, latter toothless and gaping on prehensile margin, spatulate at tips.

Male with P11 gently curved, slender, cylindrical basal article bearing broadened, foliaceous terminal part forking into acute mesial and lateral tips; P12 stouter and longer, slender cylindrical basal article bearing elongate oval terminal section consisting of proximal and distal connate lobes, somewhat cupped on anterior aspect but ciliate over convex posterior aspect, longest setae on margin; P13-5 much smaller, not obviously biramous. Female with P12 smaller than P13-5, not obviously biramous.

Discussion

The new species placed in the new subfamily Shinkaiinae has a superficial resemblance to the Porcellanidae in the shape of chelipeds and walking legs, but it apparently fits the definition of the Galatheidae (Boas 1907; Balss 1957; Baba 1990), with regard to the: (1) antennular peduncles bearing a strongly spined basal article; (2) antennal peduncles composed of four articles; (3) last thoracic sternite being separated from the preceding sternite; and (4) gill formula (four pleurobranchs, ten arthrobranchs, and an epipod on maxilliped 3).

The reduced eyes and lack of lash on exopods of the first maxilliped indicate that the new species is close to the Munidopsinae, but may be differentiated from that subfamily by the:

– flattish carapace without dorsal grooves;
– strong angle lateral to the flattened immobile eyestalk;
– anteriorly produced pterygostomian flap covering greater part of the antennal peduncle;
– lack of elevated transverse ridges between thoracic sternites 4-7;
– dense plumose setae on the sternum, pterygostomian flap, and ventral surface of legs;
– epipods on the third maxillipeds short, tapering to end, and bearing short setae distally;
– epipods present on pereopods 1-3. Chace (1942), however, pointed out inconsistency in

presence of epipods on legs of *Munidopsis* species. All epipods including those on the third maxillipeds are short and subequal in the present species, but in other galatheids (Galatheinae and Munidopsinae) they are usually elongate and mastigobranchiate on the third maxillipeds, and if present, on the pereopods.

The immobile eyestalks each bearing a transversely subterminal cornea or remnants of it on the ventral surface, and the orbits hardly visible in dorsal view might also be considered to characte-

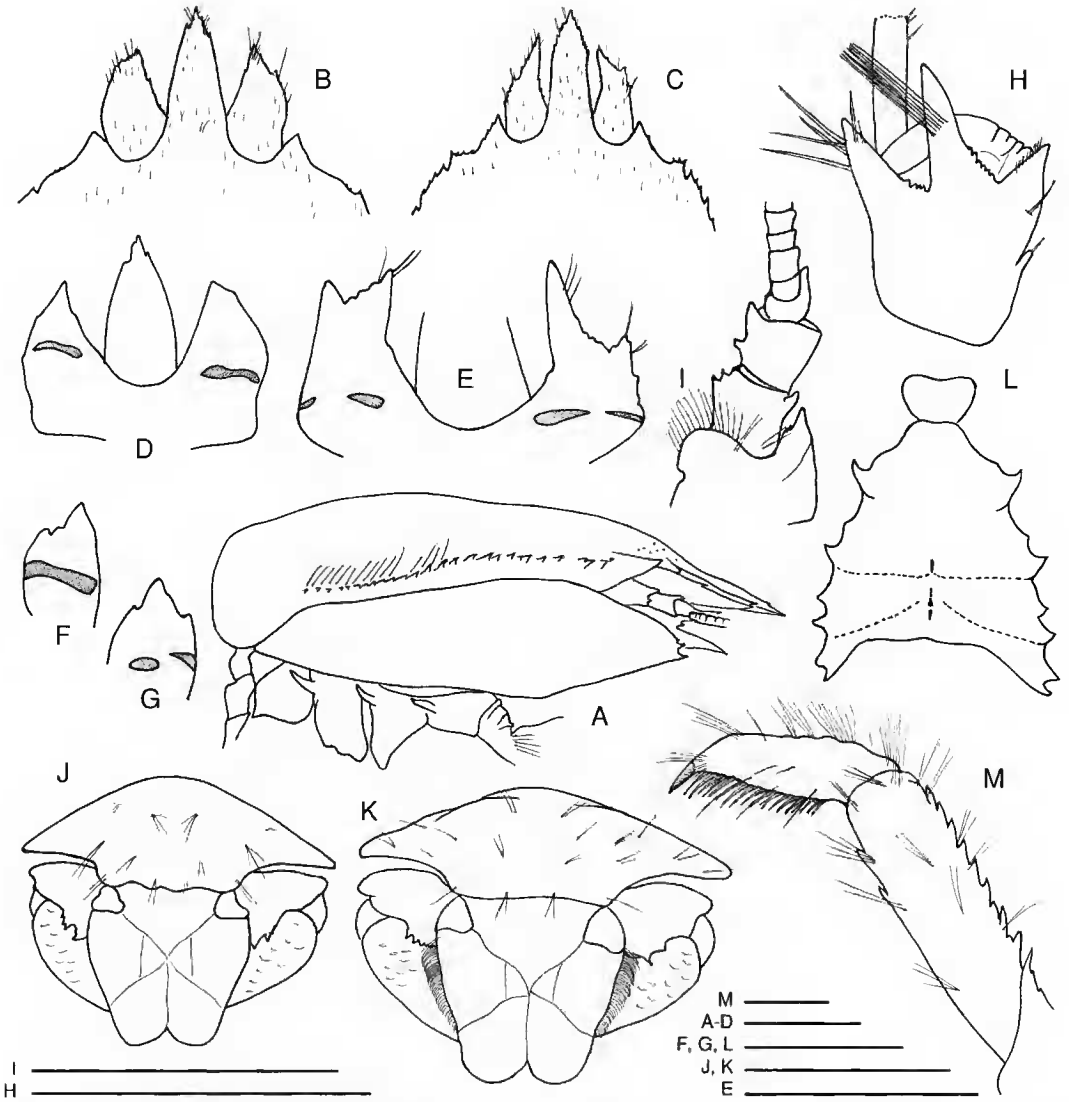

FIG. 5. — *Shinkaia crosnieri* n.sp.; **A**, **C**, **I**, **M**, ♀; **E**, **F** ovig. ♀, paratypes, USNM 251481; **B**, **D**, ♂, **J**, ♀, **K**, ♂, paratypes, JMSTC Ano-0006-93; **F**, **G**, **H**, **L**, ♂, paratypes, JMSTC Ano-0001-90; **A**, carapace and proximal articles of pereopods, right lateral; **B**, rostrum, eyestalks and anterior carapace, dorsal; **C**, same; **D**, rostrum and eyestalks, ventral and slightly tilted toward viewer, cornea lenticular (shaded); **E**, eyestalks and base of rostrum, ventral and slightly tilted toward viewer, cornea discontinuous (shaded); **F**, eyestalks showing variation in shape of cornea, ventral, transverse bar, right; **G**, same, central oval and lateral wedge interrupted, left; **H**, basal antennular article and part of succeeding articles, right; **I**, antennal peduncle, left; **J**, sixth segment of abdomen, telson and uropods, dorsal, ♀; **K**, same, ♂; **L**, thoracic sternum (denuded); **M**, dactyl and propodus, right P2. Scale bars: A-L, 10 mm; M, 4 mm.

rize the Shinkaiinae, but somewhat similar eyestalks are known in *Munidopsis subchelata* Balss, 1913, from west of Sumatra (Balss 1913; Doflein & Balss 1913) [*M. plana* Baba, 1986, from Okinawa Trough appears to be a synonym of this species].

The characters for the subfamily Shinkaiinae listed here fit well within those that define the family Galatheidae; therefore, the key to genera of Galatheidae provided by Baba (1988: 53) can be modified to accommodate *Shinkaia* (the Shinkaiinae) as follows:

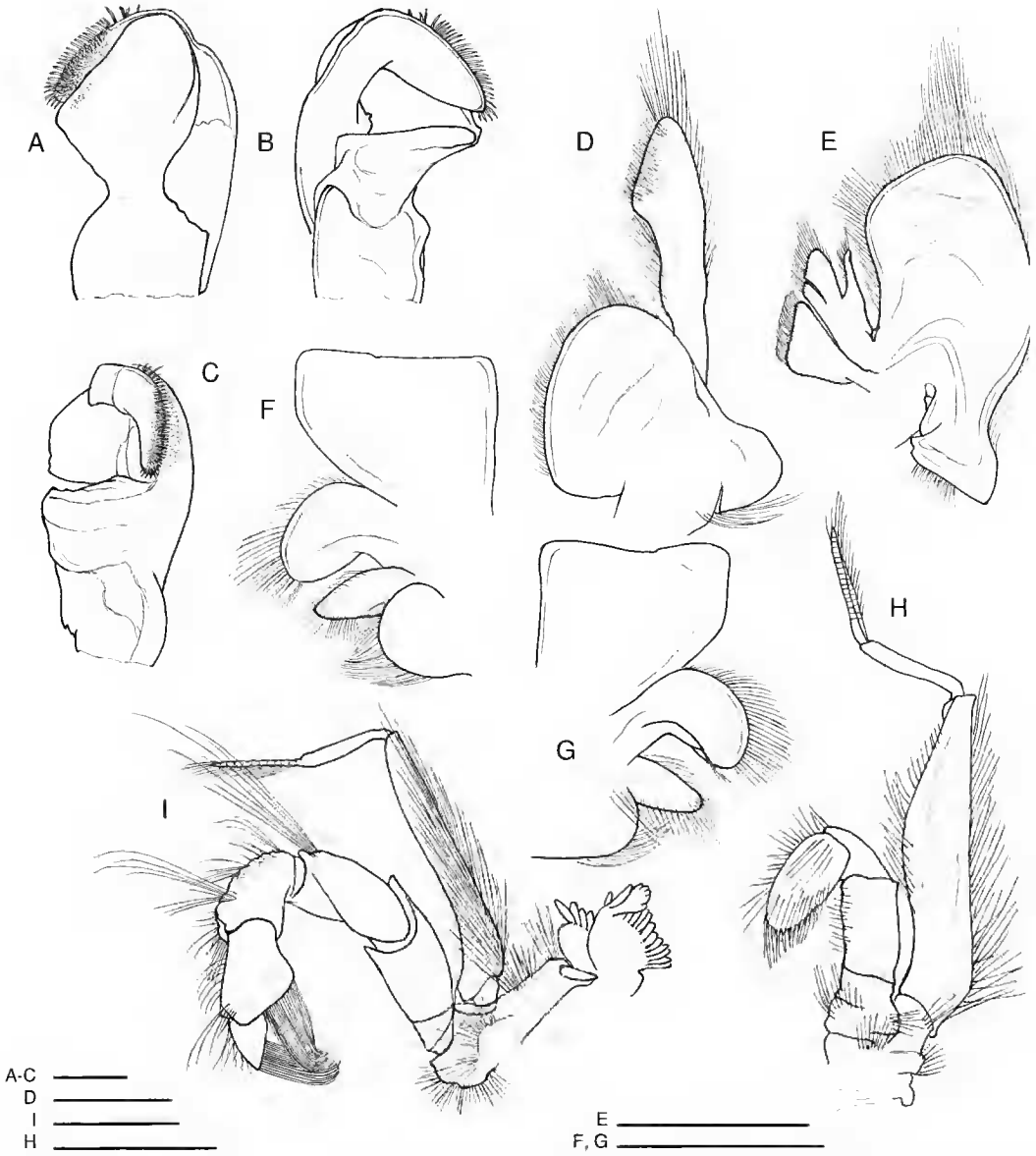

FIG. 6. — *Shinkaia crosnieri* n.sp., mouthparts: **A-C**, paratype ♀, USNM 251482; **A**, mandible, left ventral; **B**, same, dorsal; **C**, same mesial; **D-I**, paratype ♀, newly molted, USNM 251481; **D**, maxillule, left ventral; **E**, maxilla, left ventral; **F**, first maxilliped, left ventral; **G**, same, left oral; **H**, second maxilliped, left ventral; **I**, third maxilliped, left ventral. Scale bars: A-C, E-G, 10 mm; D, H, I, 4 mm.

1. Eyes usually well-developed; exopod of first maxilliped with lash..... ..... Subfamily Galatheinae

— Eyes usually reduced; exopod of first maxilliped without lash 2

2. Ventral aspect of cephalothorax not clothed with mat of long silky setae .... Subfamily Munidopsinae, *Munidopsis*

— Ventral aspect of cephalothorax clothed with mat of long silky setae .... Subfamily Shinkaiinae, *Shinkaia*

The unusual deeply excavated longitudinal ventral pit on the propodus of each chela of *Shinkaia crosnieri* (Fig. 4) might seem to be unique to the Shinkaiinae, but that is not so. *Munidopsis lentigo* Williams *et* Van Dover, 1983 has a shallower but similar ventral spot on each chela near the articulation of the dactyl. Both of these species are limited to marine hydrothermal environments, so far as known, but Williams & Van Dover noted similar spots on chelae of non-hydrothermal homolid crabs.

Hashimoto *et al.* (1995) gave an excellent ecological and biogeographic summary of faunal elements sampled from marine chemosynthetic communities of southern Japan. Among the latter, the Okinawa Trough is a depression about 100 km wide by 1000 km long. Biological communities reported there by them were discovered on Minami-Ensei Knoll in the central graben of the Okinawa Trough approximately 140 km west of Amami Ohshima Island. Uneven topography in depths, varying from *ca.* 500 to more than 1000 m, suggests volcanic origin. These depths are somewhat less than those from which the reported samples of *Shinkaia crosnieri* were photographed and collected.

There are minor differences among individuals of *S. crosnieri* in samples taken from the Okinawa Trough and those from Edison Seamount, eyestalks and tostrum in the latter tending to be slightly more slender and elongate than in those from the Okinawa region, but measurements of these features overlap in the series as a whole, so there are no clear-cut differences among individuals in these samples that obviously come from widely separated localities on different tectonic plates. Galkin (1992) was well aware of distributional problems concerning isolated hydrothermal communities, but acknowledged evidence of extensive faunistic exchange between individual basins and among mid-oceanic ridge systems. It will be interesting to see if the observed distributional pattern for the new species is sustained when other specimens are collected in this region.

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